INK CONTAINER OPENER

[0001] The invention relates to an ink container opener. More particularly, it relates to an ink container opener which is adapted to be used to remove caps from several types of ink containers, used in ink jet printing.

Background of the Invention

[0002] An ink container typically includes a container body and a container cap. The cap is usually ultrasonically welded, glued or heat staked to the body after the container has been filled with ink during initial manufacturing. Once the ink has been depleted from the container, the container can be reused by refilling it with ink. Refilling ink cartridges with ink is a two step process. First, access must be provided such as by breaking open and removing the cap from the cartridge. Then, the reservoir must be refilled. To assist in refilling the ink container, the user usually drills holes through the cap to provide access into the interior of the container so that ink can be added. At times the ink container cap may be fabricated of a rigid plastic material that is difficult to penetrate using a hand-held drill bit which is typically supplied with ink refill kits. Thus, drilling holes into the cap can be difficult for the user, especially for a color ink container where three holes are required.

[0003] Accordingly, there is a need for a way to easily remove the cap from an ink supply container to enable the addition of more ink, thereby extending the useful life of the container. Thus, there is a need for an ink container opener that allows the consumer or user to remove the container cap without drilling holes into the cap.

[0004] One drawback of prior ink cartridge openers is the lack of a firm grip for the cartridge during a somewhat delicate procedure of separating ink top and bottom portions of the cartridge. Furthermore, another drawback of some of the openers is they require two or more pieces. While these multi-piece openers have been effective apparatus for opening cartridges, there is a need for an improved one-piece ink cartridge opener having enhanced gripping and stability features.

[0005] Furthermore, it is desirable to provide a one-piece cap removal tool which can be used with more than one type of ink container.

Summary of the Invention

[0006] The present invention is directed to an ink cartridge opener for removing a cap from the ink supply cartridge to enable the addition of more ink, thereby extending the useful life of the cartridge. More particularly, the present invention includes a container opener which enables the consumer to remove the container cap from different types of ink containers using a single piece L-shaped opener. A first or holder member holds the cap of the container and a second member or base member provides for the container to be supported in cantilever fashion when force is applied to the container body. The user pushes down and exerts force onto an end of the container body spaced from the holder with the palm of his or her hand. This downward force then enables the cap to be disconnected or separated from the body. The opener enables a consumer to remove a cartridge cap using an opener design which securely holds the cap of the cartridge while the consumer pushes down on the cartridge body with the palm of his or her hand.

[0007] In accordance with another aspect of the invention, an ink container opener has a first portion and a second portion connected to the first portion. The first and second portions are approximately perpendicular to each other and each has an opening therein. The openings are each substantially rectangular in shape and of different size and/or edge profile for accommodating the caps of the different cartridges. The opening of the first portion can, for example, comprise a plurality of ridges extending along at least one side of the opening. The opening in the second portion can, for example, be smaller and have linear edges.

[0008] The fact that the opener can be used with more than one type of ink container by having several openings for receiving various ink container caps is of considerable advantage in that the opener requires less storage space than several openers for different size cartridges. The opener also requires less inventory to accommodate different ink container manufacturers.

[0009] Another advantage of the present invention is that the user's weight can be used in addition to hand and arm muscles to apply force to the container to open the container. In this respect, the opener can rest on the top of a work surface to absorb the applied force, thereby enabling operation with one hand. Alternatively, a consumer can apply force to the opener on the floor by the ball of a foot.

[0010] Of further advantage is that the cantilever support provides a mechanical advantage of approximately eight to one (8:1).

[0011] Another advantage of the invention is serrated edges of an opening to provide a more secure grip on the container cap.

[0012] Still other aspects and advantages of the invention will become apparent to those skilled in the art upon reading and understanding the following detailed description.

Brief Description of the Drawings

[0013] The invention may take form in certain components and structures, a preferred embodiment of which is illustrated in the accompanying drawings wherein:

[0014] FIGURE 1A is a perspective view of a one-piece ink container opener in accordance with a preferred embodiment of the present invention;

[0015] FIGURE 1B is a front elevational view of the ink container opener of FIGURE 1A;

[0016] FIGURE 2A is a top plan view of the ink container opener of FIGURE 1;

[0017] FIGURE 2B is a side elevational view of the ink container opener of FIGURE 1 showing an ink container installed in the opener in phantom;

[0018] FIGURE 3 is a perspective view of a user manually applying force to an ink container mounted in the ink container opener of FIGURE 1; and,

[0019] FIGURE 4 is a perspective view of an ink container refill kit with the ink container opener of FIGURE 1 mounted therein.

Detailed Description of Preferred Embodiments

[0020] Referring now to the drawings, wherein the showings are for purposes of illustrating the preferred embodiments of this invention only and not for purposes of limiting same, FIGURES 1A-1B and 2A-2B show an ink container opener **A** having a body **10** with a first member or arm **12** and a second member or arm **14** substantially perpendicular to each other. Each of the arms is substantially rectangular in shape and has flat surfaces. Arm **14** is shown to be of the same length or longer along a longitudinal axis than arm **12**. However, arm **12** could be of the same length or longer than arm **14** in alternate embodiments. First arm or holder member **12** has an opening **16** adapted to receive a first portion or a cap of an associated ink container **B** (see Figures 2B and 3). Opening **16** is shown to be rectangular in configuration; however, other shapes are also contemplated by the invention. A plurality of ridges **18** extend along edges **19, 21** of opening **16**. As can be seen in FIGURES 1A and 1B, the ridges are parallel to each other and are equally spaced apart. The ridges are also shown to be on edges which are opposite one another in the opening. However, ridges could also be provided on the opposing edges **23, 25**. The ridges are shown to be shaped as rectangular bars; however, the

ridges could be formed with sharp or serrated edges to provide a grip for engaging the outer surface of an ink cartridge cap member **40** (see Figure 3).

[0021] The holder portion **12** and the second arm or base portion **14** are formed of a unitary construction from metal, or another suitable material, and are oriented approximately perpendicular to each other to form an L-shaped configuration. Reinforcement members **24** can be provided and interposed between the two members to provide additional strength and rigidity to the opener. As shown in the figures, reinforcement members **24** are generally triangular in shape and are parallel to and spaced apart from each other. The reinforcement members can be of a unitary construction with the base and holder members; however, they can also be welded to or otherwise secured to the two members.

[0022] Holder member **12** has a first end **20** and a second end **22** where the opening is positioned adjacent to the first end and the reinforcement members are positioned adjacent to the second end. Base member **14** has a first end **26** and a second end **27** where the reinforcement members are positioned adjacent the first end. Raised edges or ridges **28, 29, 30** are positioned on a surface **31** of base member **14** to provide additional strength and rigidity to the base member.

[0023] The base member **14** has an opening **32** adapted to receive a differently sized cap than opening **16**. In the embodiment disclosed herein, opening **16** is adapted to receive a container cap from a container such as the Lexmark 12A1980 container, and opening **32** is adapted to receive a cap from a container such as the Lexmark 10N0026 container. As seen in FIGURE 1A, opening **32** is also rectangular in configuration; however, other shapes are also contemplated by the invention. Opening **32** is shown to include a plurality of linear edges **33**. Opening **32** is also shown to not include serrated edges; however, ridges or serrated edges could be provided in opening **32** if desired. A raised edge or rib **34** is provided on base **14** to add rigidity and strength to the base adjacent the opening **32**. Opening **35** is provided to accommodate a portion of the cap of the Lexmark 10N0026 container.

[0024] Referring now to FIGURE 3, usage of the opener to separate a cap from an ink container will now be described. An ink container is positioned within the ink container opener by inserting cap **40** of the container within opening **16**. A lip or ridge on the bottom edge of the container cap abuts the ridges **18** of opening **16**. As will be appreciated from FIGURES 1 and 3, the container body is supported in cantilever fashion and a user's hand **50** then applies a downward force to the ink container thereby engaging the cap with the ridges **18** of opening **16** and applying force to the second portion or main body **42** of the container until the cap is disconnected from or separated from the container body. Member **14** acts as a support member

that rests on a support surface such as a table or floor. The ink container is positioned between first and second ends **26, 27** of the support member **14** and is parallel to member **14**. The support member **14** extends along a longitudinal axis of the container. The user's weight can be used in addition to hand and arm muscles. The opener can be placed on a work surface such as a desk or table to absorb the applied force of the user. This would enable a one-handed application of force to the ink container. Alternatively, for a user with weak hands or arms, or when the cap is too secure to achieve separation by hand, the opener can be placed on a floor surface and the ball or heel of the user's foot can apply the force directly to the ink container body. As seen in FIGURE 3, the force to disconnect the cap from a container is applied in a downwardly direction by the palm of a user's hand. Alternatively, the force can be applied in a horizontal or other direction based on the orientation of the ink container opener. In this respect, for example, the opener could be hung on a wall with member **12** extending horizontally, whereby the container would extend vertically when cap **40** is introduced into opening **16**.

[0025] The opener provides a mechanical force advantage of approximately eight to one (8:1). That is, referring to Figure 3, the distance **C** from the force application point **D** in a longitudinal direction to the cap or body joint **E** is approximately eight times greater than the distance **F** from the cap support point **G** to the cap body joint **E**.

[0026] If opening **32** of the base **14** is to be used to separate a cap from a differently sized ink container (such as the Lexmark 10N0026 cartridge), the steps would be essentially as described above for using opening **16** to open a container except the holder member would be placed on a support surface and a cap would be inserted into opening **32**.

[0027] The base member is shown to be longer in a longitudinal direction than the holder member; however, other dimensions for the members can also be used. As previously mentioned, the opener is formed with a substantial L-shaped configuration. The L-shape of the opener allows for space efficiency within a refill kit container. That is, the opener can be placed into a corner of a refill kit container **H** as seen in FIGURE 4 along with a plurality of ink supply bottles **I** and requires only a small increase in the refill kit container volume.

[0028] The invention has been described with reference to a preferred embodiment. Obviously, alterations and modifications will occur to others upon a reading and understanding of this specification. The invention is intended to include all such modifications and alterations insofar as they come within the scope of the appended claims or the equivalents thereof.